Setting up image transformations for training and testing...

Image transformations are ready.

Defining custom dataset class for wheat disease images...

Custom dataset class defined.

Preparing data loaders and splitting dataset if needed...

CUDA device count: 2

Current CUDA device: 0

CUDA device name: Tesla T4

Loading data...

Found existing split dataset. Loading splits...

Calculating class weights for balanced sampling...

Data loaders are ready.

Data loaded. Classes: ['aphid', 'army\_worm', 'black\_rust', 'brown\_rust', 'common\_rust', 'fusarium\_head\_blight', 'healthy', 'leaf\_blight', 'powdery\_mildew\_leaf', 'spetoria', 'tan\_spot', 'yellow\_rust']

Initializing model...

Using device: cuda

Model initialized. Starting training...

/tmp/ipykernel\_36/606614384.py:43: FutureWarning: `torch.cuda.amp.GradScaler(args...)` is deprecated. Please use `torch.amp.GradScaler('cuda', args...)` instead.

scaler = torch.cuda.amp.GradScaler(enabled=USE\_MIXED\_PRECISION)

/tmp/ipykernel\_36/606614384.py:54: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.

with torch.cuda.amp.autocast(enabled=USE\_MIXED\_PRECISION):

/tmp/ipykernel\_36/606614384.py:73: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.

with torch.cuda.amp.autocast(enabled=USE\_MIXED\_PRECISION):

Epoch 1/10 | Train Loss: 1.2953 Acc: 0.6349 | Val Loss: 0.5372 Acc: 0.8541 | LR: 0.000100 | Time: 65.2s

Epoch 2/10 | Train Loss: 0.4371 Acc: 0.8684 | Val Loss: 0.3226 Acc: 0.8950 | LR: 0.000100 | Time: 56.9s

Epoch 3/10 | Train Loss: 0.3132 Acc: 0.9077 | Val Loss: 0.3040 Acc: 0.8986 | LR: 0.000100 | Time: 55.6s

Epoch 4/10 | Train Loss: 0.2482 Acc: 0.9180 | Val Loss: 0.2810 Acc: 0.9146 | LR: 0.000100 | Time: 58.0s

Epoch 5/10 | Train Loss: 0.1959 Acc: 0.9355 | Val Loss: 0.2871 Acc: 0.9075 | LR: 0.000100 | Time: 57.3s

Epoch 6/10 | Train Loss: 0.1649 Acc: 0.9466 | Val Loss: 0.2947 Acc: 0.9181 | LR: 0.000100 | Time: 57.5s

Epoch 7/10 | Train Loss: 0.1391 Acc: 0.9565 | Val Loss: 0.2584 Acc: 0.9164 | LR: 0.000100 | Time: 56.2s

Epoch 8/10 | Train Loss: 0.1155 Acc: 0.9660 | Val Loss: 0.2921 Acc: 0.9021 | LR: 0.000100 | Time: 56.2s

Epoch 9/10 | Train Loss: 0.1052 Acc: 0.9702 | Val Loss: 0.2872 Acc: 0.9093 | LR: 0.000100 | Time: 56.6s

Epoch 10/10 | Train Loss: 0.1049 Acc: 0.9676 | Val Loss: 0.2567 Acc: 0.9110 | LR: 0.000100 | Time: 59.7s

Entraînement terminé.

Training complete. Evaluating on test set...

Test set predictions complete. Generating confusion matrix...

A screenshot of a computer

AI-generated content may be incorrect.

Rapport de classification:

precision recall f1-score support

aphid 0.9286 0.8864 0.9070 44

army\_worm 1.0000 0.9535 0.9762 43

black\_rust 0.7843 0.8696 0.8247 46

brown\_rust 0.9149 0.9773 0.9451 44

common\_rust 0.8793 0.9623 0.9189 53

fusarium\_head\_blight 1.0000 1.0000 1.0000 35

healthy 0.9600 1.0000 0.9796 72

leaf\_blight 0.8621 0.5319 0.6579 47

powdery\_mildew\_leaf 0.8929 0.9259 0.9091 54

spetoria 0.8913 1.0000 0.9425 41

tan\_spot 0.6944 0.6757 0.6849 37

yellow\_rust 1.0000 1.0000 1.0000 47

accuracy 0.9041 563

macro avg 0.9006 0.8985 0.8955 563

weighted avg 0.9039 0.9041 0.8999 563

Model saved to ../saved\_models\_and\_data/wheat\_disease\_convnext\_model.pth

Done. Executed notebook saved as 'train\_convnext\_executed.ipynb'